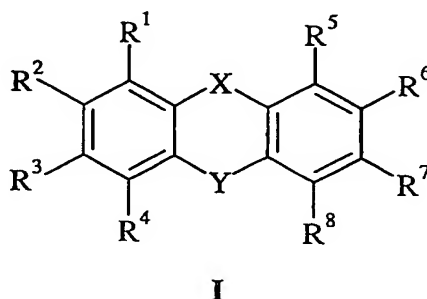


What is claimed is:

Claim 1. An insecticidal composition comprising at least one of an insecticidally effective amount of a compound of formula I and at least one insecticidally compatible carrier therefor, wherein the compound of formula I is:



wherein

$R^1$  through  $R^8$ , inclusively, are independently selected from hydrogen, halogen, alkyl, cycloalkyl, alkenyl, alkynyl, trialkylsilylalkynyl, alkoxy, haloalkyl, haloalkoxy, alkylthio, alkylsulfinyl, alkylsulfonyl, haloalkylthio, haloalkylsulfinyl, haloalkylsulfonyl, dialkylaminosulfonyl, nitro, cyano, amino, formyl, or alkylcarbonyl;

X is selected from  $-\text{CR}^9\text{R}^{10}-$ ,  $-\text{CR}^{11}\text{R}^{12}\text{CR}^{13}\text{R}^{14}-$ ,  $-\text{CR}^{15}=\text{CR}^{16}-$ ,  $-\text{NR}^{17}-$ ,  $-\text{CR}^{18}\text{R}^{19}\text{NR}^{20}-$ , or  $-\text{CR}^{21}=\text{N}-$ ;

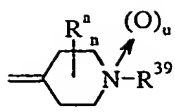
and

Y is selected from  $-\text{CR}^{22}\text{R}^{23}-$ ,  $-\text{CR}^{24}\text{R}^{25}\text{CR}^{26}\text{R}^{27}-$ ,  $-\text{CR}^{28}=\text{CR}^{29}-$ ,  $-\text{NR}^{30}-$ ,  $-\text{CR}^{31}\text{R}^{32}\text{NR}^{33}-$ ,  $-\text{O}-$ ,  $-\text{S}-$ ,  $-\text{S}(\text{O})-$ ,  $-\text{S}(\text{O})_2-$ ,  $-\text{CR}^{34}\text{R}^{35}\text{O}-$ ,  $-\text{CR}^{36}\text{R}^{37}\text{S}-$ , or  $-\text{CR}^{38}=\text{N}-$ ;

where

$R^9$  and  $R^{10}$  are independently selected from hydrogen, alkyl, or (piperidin-4-yl)alkyl;

or

$R^9$  and  $R^{10}$  may be taken together with , or with  $=CHC_2H_4NR^{40}R^{41}$ , where

$R^{39}$ ,  $R^{40}$  and  $R^{41}$  are independently selected from hydrogen; alkyl; hydroxylalkyl; alkoxyalkyl; alkylthioalkyl; alkoxycarbonylalkyl; haloalkoxycarbonyl; arylalkyl; aryloxyalkyl; arylcarbonylalkyl; arylcarbonyloxyalkyl, wherein aryl is optionally substituted with one or more halogen, alkoxy, haloalkyl, or aryl;

or

$R^{40}$  and  $R^{41}$  may be taken together with  $-C_2H_4N(CH_3)C_2H_4-$  to form a piperazine ring;

$u$  is 0 or 1,

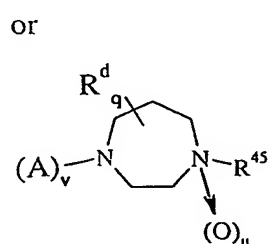
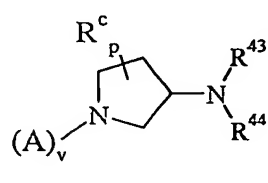
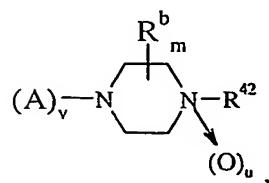
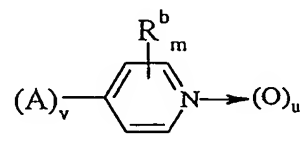
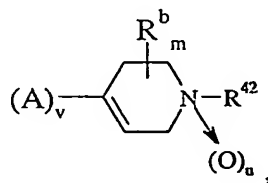
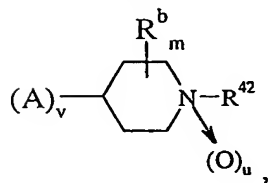
and when  $u$  is 1, an N-oxide is formed;

$n$  is 0, and  $R^a$  is hydrogen;

or

$n$  is 1 to 8, and  $R^a$  is selected from one or more of alkyl, alkoxyalkyl, alkoxycarbonyl, and aryl, wherein aryl is optionally substituted with one or more halogen, alkoxy, haloalkyl, or aryl;

$R^{11}$  is selected from hydrogen, alkyl, alkylaminoalkoxy, dialkylaminoalkoxy,  $N(\text{alkyl})(\text{alkylaminoalkyl})$ ,  $N(\text{alkyl})(\text{dialkylaminoalkyl})$ , alkylaminoalkylalkynyl, dialkylaminoalkylalkynyl, morpholinyl, imidazoliny, alkylpyrrolidinyloxy,



where

v is 0 or 1,

and when v is 1, A is a bridging group selected from -O-, -S-, -NH-, and -CH<sub>2</sub>-;

u is as described above;

R<sup>42</sup> through R<sup>45</sup>, inclusively, are independently selected from hydrogen; alkyl; alkenyl; alkynyl; hydroxylalkyl; alkoxyalkyl; alkylthioalkyl; alkylcarbonyl; alkoxyalkyl; haloalkoxyalkyl; arylalkyl; aryloxyalkyl; arylcarbonylalkyl; arylcarbonyloxyalkyl; heteroaryl; heteroarylalkyl; heteroarylalkylamino; wherein aryl and heteroaryl are optionally substituted with one or more halogen, alkoxy, haloalkyl, or aryl;

or

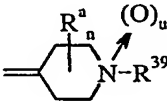
R<sup>43</sup> and R<sup>44</sup> may be taken together with -C<sub>5</sub>H<sub>10</sub>- to form a piperidine ring;

m, p, and q are 0, and R<sup>b</sup>, R<sup>c</sup> and R<sup>d</sup> are hydrogen;

or

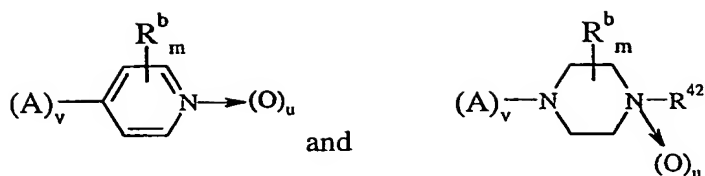
m is 1 to 8, p is 1 to 7, and q is 1 to 10, and R<sup>b</sup>, R<sup>c</sup>, and R<sup>d</sup>, respectively, are independently selected from one or more of alkyl, alkoxyalkyl, alkylamino, dialkylamino, alkoxyalkyl, or aryl, wherein aryl is optionally substituted with one or more halogen, alkoxy, haloalkyl, or aryl;

or

R<sup>11</sup> and R<sup>12</sup> may be taken together with  where R<sup>a</sup>, n, u, and R<sup>39</sup> are as described above;

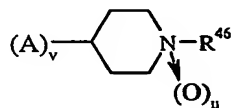
R<sup>12</sup>, when not taken together with R<sup>11</sup>, and R<sup>13</sup>, R<sup>14</sup>, and R<sup>16</sup>, are independently selected from hydrogen, hydroxy, halogen, alkyl, alkoxy, alkylcarbonyl, alkylcarbonyloxy, alkoxyalkyl, alkoxyalkyl, alkoxyalkyl, alkylaminocarbonyl, dialkylaminocarbonyl, alkylaminocarbonyloxy, dialkylaminocarbonyloxy, alkylaminosulfonyl, or dialkylaminosulfonyl;

R<sup>15</sup> is selected from



where  $m$ ,  $u$ ,  $v$ ,  $A$ ,  $R^b$  and  $R^{42}$  are as described above;

$R^{17}$  is hydrogen; alkyl; alkoxyalkyl; alkoxycarbonyl; dialkylaminoalkyl; alkylaminocarbonyl; dialkylaminocarbonyl; alkylsulfonyl; aryl, and arylalkyl wherein aryl is optionally substituted with one or more halogen, alkoxy, haloalkyl,



or aryl; or  $-C_3H_6NR^{47}R^{48}$

where

$A$ ,  $v$ , and  $u$  are as described above;

$R^{46}$  is selected from selected from hydrogen; alkyl; alkenyl; alkynyl; hydroxylalkyl; alkoxyalkyl; alkylthioalkyl; alkylcarbonyl; alkoxycarbonylalkyl; haloalkoxycarbonyl; arylalkyl; aryloxyalkyl; arylcarbonylalkyl; arylcarbonyloxyalkyl; heteroaryl; heteroarylalkyl; heteroarylalkylamino; wherein aryl and heteroaryl are optionally substituted with one or more halogen, alkoxy, haloalkyl, or aryl;

$R^{47}$  and  $R^{48}$  are independently selected from hydrogen and alkyl;

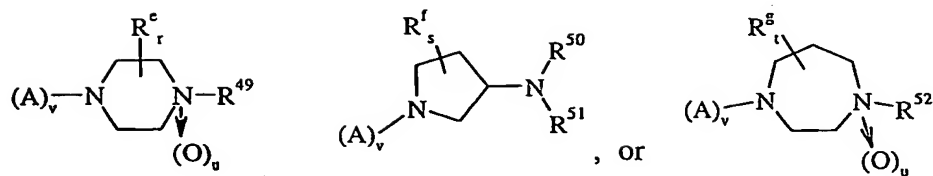
or

$R^{47}$  and  $R^{48}$  may be taken together with  $-C_5H_{10}-$  to form a piperidine ring, or with  $-C_2H_4N(CH_3)C_2H_4-$ , or  $-C_2H_4N(C_2H_4OH)C_2H_4-$  to form a piperazine ring;

$R^{18}$  and  $R^{19}$  are independently selected from hydrogen, alkyl, amino, alkylaminoalkyl, and dialkylaminoalkyl;

$R^{20}$  is selected from hydrogen; alkyl; alkoxyalkyl; alkoxycarbonyl; dialkylaminoalkyl; alkylaminocarbonyl; dialkylaminocarbonyl; alkylsulfonyl; aryl, and arylalkyl wherein aryl is optionally substituted with one or more halogen, alkoxy, haloalkyl, or aryl;

$R^{21}$  is selected from hydrogen, alkyl,



where

A, v, and u are as described above;

R<sup>49</sup> through R<sup>52</sup>, inclusively, are independently selected from hydrogen; alkyl; alkenyl, alkynyl, hydroxylalkyl; alkoxyalkyl; alkylthioalkyl; alkylcarbonyl, alkoxyalkyl; haloalkoxycarbonyl; arylalkyl; aryloxyalkyl; arylcarbonylalkyl; arylcarbonyloxyalkyl, heteroaryl, heteroarylalkyl, heteroarylalkylamino, wherein aryl and heteroaryl are optionally substituted with one or more halogen, alkoxy, haloalkyl, or aryl;

or

R<sup>50</sup> and R<sup>51</sup> may be taken together with -C<sub>5</sub>H<sub>10</sub>- to form a piperidine ring;

r, s, and t are 0, and R<sup>e</sup>, R<sup>f</sup>, and R<sup>g</sup> are hydrogen,

or

r is 1 to 8, s is 1 to 7, t is 1 to 10, and R<sup>e</sup>, R<sup>f</sup>, and R<sup>g</sup>, respectively, are independently selected from one or more of alkyl, alkoxyalkyl, alkylamino, dialkylamino, alkoxyalkyl, or aryl, wherein aryl is optionally substituted with one or more halogen, alkoxy, haloalkyl, or aryl;

R<sup>22</sup> through R<sup>29</sup>, inclusively, are independently selected from hydrogen, and alkyl;

R<sup>30</sup> is selected from hydrogen; alkyl; alkoxyalkyl; alkoxyalkyl; dialkylaminoalkyl; alkylaminocarbonyl; dialkylaminocarbonyl; alkylsulfonyl; aryl, and arylalkyl wherein aryl is optionally substituted with one or more halogen, alkoxy, haloalkyl, or aryl;

R<sup>31</sup> and R<sup>32</sup> are independently selected from hydrogen, and alkyl,

R<sup>33</sup> is selected from hydrogen; alkyl; alkoxyalkyl; alkoxyalkyl; dialkylaminoalkyl; alkylaminocarbonyl; dialkylaminocarbonyl; alkylsulfonyl; aryl, and arylalkyl wherein aryl is optionally substituted with one or more halogen, alkoxy, haloalkyl, or aryl;

R<sup>34</sup> through R<sup>38</sup>, inclusively, are independently selected from hydrogen, and alkyl;

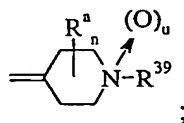
and,

agriculturally acceptable salts thereof.

Claim 2. An insecticidal composition of claim 1, wherein X is  $-\text{CR}^9\text{R}^{10}-$  and Y is selected from  $-\text{O}-$ ,  $-\text{S}-$ ,  $-\text{CR}^{22}\text{R}^{23}-$ , and  $-\text{CR}^{34}\text{R}^{35}\text{O}-$ ;

where

$\text{R}^9$  and  $\text{R}^{10}$  are taken together with



where

$\text{R}^{39}$  is selected from hydrogen; alkyl; hydroxylalkyl; alkoxyalkyl; alkylthioalkyl; alkoxyalkyl; haloalkoxycarbonyl; arylalkyl; aryloxyalkyl; arylcarbonylalkyl; arylcarbonyloxyalkyl, wherein aryl is optionally substituted with one or more halogen, alkoxy, haloalkyl, or aryl;

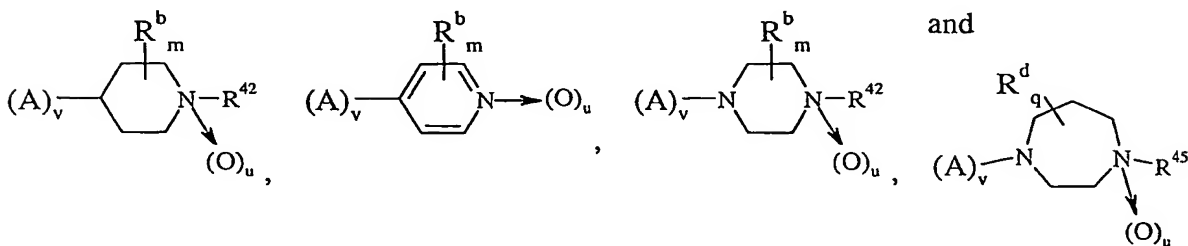
and,

$\text{R}^{22}$ ,  $\text{R}^{23}$ ,  $\text{R}^{34}$  and  $\text{R}^{35}$  are independently selected from hydrogen and alkyl.

Claim 3. An insecticidal composition of claim 1, wherein X is  $-\text{CR}^{11}\text{R}^{12}\text{CR}^{13}\text{R}^{14}-$  and Y is selected from  $-\text{O}-$ ,  $-\text{S}-$  and  $-\text{CR}^{22}\text{R}^{23}-$ ;

where

$\text{R}^{11}$  is selected from



where

$\text{R}^{42}$  and  $\text{R}^{45}$  are independently selected from hydrogen; alkyl; alkenyl; alkynyl; hydroxylalkyl; alkoxyalkyl; alkylthioalkyl; alkylcarbonyl; alkoxyalkyl; haloalkoxycarbonyl; arylalkyl; aryloxyalkyl; arylcarbonylalkyl; arylcarbonyloxyalkyl; heteroaryl; heteroarylalkyl;

heteroarylalkylamino; wherein aryl and heteroaryl are optionally substituted with one or more halogen, alkoxy, haloalkyl, or aryl;

$R^{12}$  is selected from selected from hydrogen, hydroxy, halogen, alkyl, alkoxy, alkylcarbonyl, alkylcarbonyloxy, alkoxy carbonyl, alkoxy carbonyloxy, alkylaminocarbonyl, dialkylaminocarbonyl, alkylaminocarbonyloxy, dialkylaminocarbonyloxy, alkylaminosulfonyl, and dialkylaminosulfonyl;

$R^{13}$  and  $R^{14}$  are hydrogen;

and,

$R^{22}$  and  $R^{23}$  are independently selected from hydrogen and alkyl.

Claim 4. An insecticidal composition of claim 1, wherein X is  $-CR^{18}R^{19}NR^{20}-$  and Y is selected from  $-O-$ ,  $-S-$  and  $-CR^{22}R^{23}-$ ;

where

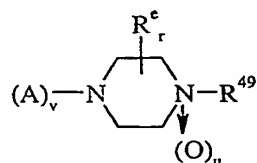
$R^{20}$  is selected from hydrogen, alkyl, alkoxyalkyl, alkoxy carbonyl, dialkylaminoalkyl, alkylaminocarbonyl, and dialkylaminocarbonyl;

and,

$R^{22}$  and  $R^{23}$  are independently selected from hydrogen and alkyl.

Claim 5. An insecticidal composition of claim 1, wherein X is  $-CR^{21}=N-$  and Y is selected from  $-S-$  and  $-CR^{22}R^{23}-$ ;

where  $R^{21}$  is



where

$R^{49}$  is selected from hydrogen; alkyl; alkenyl, alkynyl, hydroxylalkyl; alkoxyalkyl; alkylthioalkyl; alkylcarbonyl, alkoxy carbonylalkyl; haloalkoxy carbonyl; arylalkyl; aryloxyalkyl; arylcarbonylalkyl; arylcarbonyloxyalkyl, heteroaryl, heteroarylalkyl, heteroarylalkylamino, wherein aryl and heteroaryl are optionally substituted with one or more halogen, alkoxy, haloalkyl, or aryl;

and,

$R^{22}$  and  $R^{23}$  are independently selected from hydrogen and alkyl.

Claim 6. The insecticidal composition of claim 1, further comprising one or more second compounds.

Claim 7. The insecticidal composition of claim 2, further comprising one or more second compounds.

Claim 8. The insecticidal composition of claim 3, further comprising one or more second compounds.

Claim 9. The insecticidal composition of claim 4, further comprising one or more second compounds.

Claim 10. The insecticidal composition of claim 5, further comprising one or more second compounds.

Claim 11. A method of controlling insects, comprising applying an insecticidally effective amount of a composition of claim 1 to a locus where insects are present or are expected to be present.

Claim 12. A method of controlling insects, comprising applying an insecticidally effective amount of a composition of claim 2 to a locus where insects are present or are expected to be present.

Claim 13. A method of controlling insects, comprising applying an insecticidally effective amount of a composition of claim 3 to a locus where insects are present or are expected to be present.

Claim 14. A method of controlling insects, comprising applying an insecticidally effective amount of a composition of claim 4 to a locus where insects are present or are expected to be present.



Claim 15. A method of controlling insects, comprising applying an insecticidally effective amount of a composition of claim 5 to a locus where insects are present or are expected to be present.

Claim 16. A method of controlling insects, comprising applying an insecticidally effective amount of a composition of claim 6 to a locus where insects are present or are expected to be present.

Claim 17. A method of controlling insects, comprising applying an insecticidally effective amount of a composition of claim 7 to a locus where insects are present or are expected to be present.

Claim 18. A method of controlling insects, comprising applying an insecticidally effective amount of a composition of claim 8 to a locus where insects are present or are expected to be present.

Claim 19. A method of controlling insects, comprising applying an insecticidally effective amount of a composition of claim 9 to a locus where insects are present or are expected to be present.

Claim 20. A method of controlling insects, comprising applying an insecticidally effective amount of a composition of claim 10 to a locus where insects are present or are expected to be present.